Title:	:	**VAPOR-DEPOSITED METALLIZED FILM CAPACITOR**
Patent No.	:	JP 5217799
Publication Date	:	27. August. 1993
Application No.	:	JP 19920057609
Filing Date	:	31. January. 1992
Inventor(s)		MAENO TOSHIHIKO; SUZUKI YASUO
Applicant(s)	:	TOYO CONDENSER KK

ABSTRACT

PURPOSE:To obtain a vapor-deposited metallized film capacitor having excellent winding characteristics, excellent durability and heat resistance by providing a high rigidity vapor-deposited metallized film vapor-deposited with metal on a high rigidity polypropylene film having high thermal deformation temperature, Young's modulus and crystallinity and excellent stereoregularity.

CONSTITUTION:A vapor-deposited metal layer (first electrode) of a first vapor-deposited metallized film 1 is formed of a vapor-deposited aluminum 3, a vapor-deposited metal layer (second electrode) of a second vapor-deposited metallized film 2 is formed of composite vapor-deposited metal layer 23 of zinc and aluminum, and the films of the first and second films is formed of high rigidity polypropylene film. This vapor-deposited metal film capacitor has excellent heat resistance, durability and withstand voltage characteristics. Particularly, the composite vapor-deposited metallized film of zinc and aluminum with the high rigidity polypropylene film as a base has excellent heat resistance, electric characteristics and physical chemical stability.

Bibliography

---

(19) [Publication country] Japan Patent Office (JP)
(12) [Kind of official gazette] Open patent official report (A)
(11) [Publication No.] JP,5-217799,A
(43) [Date of Publication] August 27, Heisei 5 (1993)
(54) [Title of the Invention] Vacuum evaporationo metallized film capacitor
(51) [The 5th edition of International Patent Classification]

H01G 4/24 321 C 8019-5E
B 8019-5E

[Request for Examination] Un-asking.
[The number of claims] 10
[Number of Pages] 7
(21) [Application number] Japanese Patent Application No. 4-57609
(22) [Filing date] January 31, Heisei 4 (1992)
(71) [Applicant]
[Identification Number] 591174379
[Name] Oriental capacitor incorporated company
[Address] 6-5-15, Minami-Magome, Ota-ku, Tokyo
(72) [Inventor(s)]
[Name] Maeno Toshihiko
[Address] 6-5-15, Minami-Magome, Ota-ku, Tokyo Inside of Oriental capacitor incorporated company
(72) [Inventor(s)]
[Name] Suzuki Yasuo
[Address] 6-5-15, Minami-Magome, Ota-ku, Tokyo Inside of Oriental capacitor incorporated company
(74) [Attorney]
[Patent Attorney]
[Name] Murata Yukio

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any
damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.

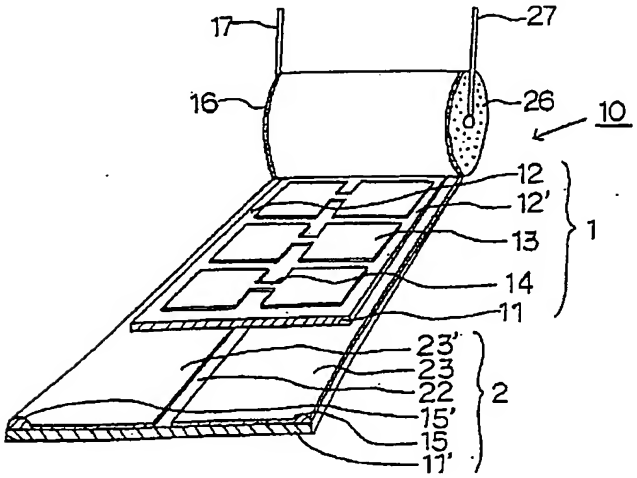
3.In the drawings, any words are not translated.

Epitome

---

(57) [Abstract]
[Objects of the Invention] Offer of a vacuum evaporationo metallized film capacitor whose endurance and thermal resistance the rolling-up working characteristic at the time of manufacture was good, and were excellent.
[Elements of the Invention] The vacuum evaporationo metallized film capacitor characterized by it being fabricated from the polypropylene resin whose heat deflection temperature is 120-140 degrees C, and coming to have the high rigidity vacuum evaporationo metalization film 220-260kg /of whose Young's modulus is [mm] 2, and which degree of crystallinity was high and vapor-deposited the metal on the good high rigidity polypropylene film of stereoregularity. In the vacuum evaporationo metallized film capacitor which pulls out the vacuum evaporationo metalization film which carried out the polymerization of the two sheets of the 1st vacuum evaporationo metalization film and the 2nd vacuum evaporationo metalization film especially to winding and its winding end face, and comes to prepare an electrode metallizing layer The vacuum evaporationo metal layer (the 1st electrode) of the 1st vacuum evaporationo metalization film is constituted from vacuum evaporationo aluminum. What constituted the vacuum evaporationo metal layer (the 2nd electrode) of the 2nd vacuum evaporationo metalization film from a compound vacuum evaporationo metal layer of zinc and aluminum, and constituted the film of the 1st vacuum evaporationo metalization film and the film of the 2nd vacuum evaporationo metalization film from an above-mentioned quantity rigidity polypropylene film is desirable.

[Translation done.]



[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The vacuum evaporationo metallized film capacitor characterized by it being fabricated from the polypropylene resin whose heat deflection temperature is 120-140 degrees C, and coming to have the high rigidity vacuum evaporationo metalization film 220-260kg /of whose Young's modulus is [mm] 2, and which degree of crystallinity was high and vapor-deposited the metal on the good high rigidity polypropylene film of stereoregularity.
[Claim 2] In the vacuum evaporationo metallized film capacitor which pulls out the vacuum evaporationo metalization film which carried out the polymerization of the two sheets of the 1st vacuum evaporationo metalization film and the 2nd vacuum evaporationo metalization film to winding and its winding end face, and comes to prepare an electrode metallizing layer The vacuum evaporationo metal layer (the 1st electrode) of the 1st vacuum evaporationo metalization film is constituted from vacuum evaporationo aluminum. The vacuum evaporationo metal layer (the 2nd electrode) of the 2nd vacuum evaporationo metalization film is constituted from a compound vacuum evaporationo metal layer of zinc and aluminum. And the vacuum evaporationo metallized film capacitor characterized by coming to constitute the film of the 1st vacuum evaporationo metalization film, and the film of the 2nd vacuum evaporationo metalization film from a high rigidity polypropylene film according to claim 1.
[Claim 3] The vacuum evaporationo metallized film capacitor according to claim 2 characterized by coming to form the electrode drawer side edge section of the 1st electrode and/or the 2nd electrode more thickly than other electrode sections.
[Claim 4] The vacuum evaporationo-ized metal film capacitor according to claim 2 or 3 characterized by being the thing for which the 1st vacuum evaporationo metalization film or the 2nd vacuum evaporationo metalization film comes to prepare the security device which leaves the thin line section which connects a vacuum evaporationo metal layer with the electrode drawer side edge section and this section, and it comes to divide in the shape of [two or more] a strip of paper.
[Claim 5] The vacuum evaporationo metallized film capacitor according to claim 3 or 4 characterized by for the thickness of the 1st electrode drawer side edge section being 1.5 - 3 ohm/cm 2 as resistance, and the thickness of other 1st electrode section being 3 - 6 ohm/cm 2 as resistance.
[Claim 6] The vacuum evaporationo metallized film capacitor according to claim 3 to 5 characterized by for the thickness of the 2nd electrode drawer side edge section being 1.5 - 6 ohm/cm 2 as resistance, and the thickness of other 2nd electrode section being 7 - 20 ohm/cm 2 as resistance.
[Claim 7] The common electrode metal vacuum evaporationo-ized film which has the common polar zone which has a non-vapor-deposited part in the longitudinal both-ends side on the top face of plastic film, and becomes a remainder straight side central part from a vacuum evaporationo metal layer The 1st electrode which consists of a longitudinal vacuum evaporationo-ized metal layer of the one side which has the thin band-like non-vapor-deposited section into the longitudinal central part of the top face of plastic film, and was formed bordering on this thin belt part, and the 2nd electrode which consists of a longitudinal vacuum evaporationo-ized metal layer of the other side the thing which comes to have the security device which is the serial vacuum-evaporationo metallized film capacitor equipped with the above, and formed the vacuum-evaporationo metal layer of the common polar zone with vacuum-evaporationo aluminum, vacuum-evaporationo zinc or zinc, and compound vacuum-evaporationo metals, such as aluminum, and constituted the common polar zone from many of the strip-of-paper-like vacuum-evaporationo metal layer of a Uichi Hidari pair connected in the thin-line section which consists of a vacuum-evaporationo metal layer -- carrying out -- and --

and it carries out having constituted plastic film from high rigidity polypropylene according to claim 1 as the description.
[Claim 8] The vacuum evaporationo metallized film capacitor characterized by inserting a vacuum evaporationo metallized film capacitor according to claim 1 to 7 in a plastics case, and coming to fill up synthetic resin, such as an epoxy resin, between said bodies of a capacitor and cases.
[Claim 9] The vacuum evaporationo metallized film capacitor characterized by inserting a vacuum evaporationo metallized film capacitor according to claim 1 to 7 in a metal or the case of plastics, and coming to pour in a liquefied epoxy resin as sinking-in liquid between the above-mentioned body of a capacitor, and a case.
[Claim 10] The vacuum evaporationo metallized film capacitor according to claim 9 characterized by sinking-in liquid consisting of ester of an aromatic series acid and higher alcohol, or mixture of these and a liquefied epoxy resin.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] Especially this invention has a good rolling-up working characteristic about a vacuum evaporationo metallized film capacitor, and it is related with the outstanding vacuum evaporationo metallized film capacitor of endurance and thermal resistance.
[0002]
[Description of the Prior Art] Generally, a vacuum evaporationo metallized film capacitor pulls out the vacuum evaporationo metalization film which carried out the polymerization of the two sheets of the 1st vacuum evaporationo metalization film and the 2nd vacuum evaporationo metalization film to winding and its winding end face, prepares an electrode metallizing layer, inserts this in a plastics case further, and is constituted. In manufacture of the vacuum evaporationo metallized film capacitor, Siwa is generated on a vacuum evaporationo metalization film at the time of rolling up, or there are troubles, like that a foreign matter mixes and a crack is attached to a film. If the quality of a capacitor is reduced and Siwa goes into a film, the air which contains moisture in the part will be held, and each of these troubles degrades the electrical property of the part, and causes local corona discharge. Fluctuation of a delicate rotational speed under rolling up or a tension, vibration of a machine, etc. are one of causes of this Siwa, and that countermeasure is searched for. Moreover, although a polypropylene film has the dielectric characteristics which were excellent as an object for capacitors and being excelled especially in loss and the temperature characteristic, thermal resistance is low as a fault and maximum service temperature is restricted to 90 degrees C or less.
[0003]
[Means for Solving the Problem and its Function] As a means to attain rolling up of the vacuum evaporationo metalization film at the time of manufacture of a film capacitor good, although

various devices, such as an auto tension and line speed, are made also in respect of equipment, it is not yet perfect. this invention person discovered that the high rigidity polypropylene film which raised crystallinity and stereoregularity remarkably fitted film capacitors, as a result of having had the electrical property which was excellent since this point was solved, the surface hardness of a film was high, Young's modulus was high, and there is little elongation, and being easy to slide, examining using the high film which is whenever [blocking] as a film which abolishes the trouble at the time of rolling up and examining various plastic film. this invention person advanced research further wholeheartedly, degree of crystallinity was high, and it succeeded in acquiring the rolling-up object of very few vacuum evaporationo metalization films of Siwa or a crack by using the vacuum evaporationo metalization film which vapor-deposited and constituted the metal on the good high rigidity polypropylene film of stereoregularity. The knowledge of this serving as a capacitor by which it has the description which was excellent as capacitors, such as a dielectric constant, again, and heat-resistant temperature bears 100 degrees C or more was carried out.

[0004] This invention is attained from the result of research and knowledge, namely, it is fabricated from the polypropylene resin whose heat deflection temperature is 120-140 degrees C, and is the vacuum evaporationo metallized film capacitor characterized by coming to have the high rigidity vacuum evaporationo metalization film 220-260kg /of whose Young's modulus is [mm] 2, and which degree of crystallinity was high and vapor-deposited the metal on the good high rigidity polypropylene film of stereoregularity. It is manufactured by film-izing the polypropylene resin which is well-known as for the very high high rigidity polypropylene film of the above-mentioned degree of crystallinity and stereoregularity (for example, refer to JP,58-104907,A and JP,2-206605,A), and pretreated the titanium trichloride and the organoaluminium compound by electron donors, such as aromatic series carboxylate, for example, high activity and whose heat deflection temperature which is made to carry out the polymerization of the propylene using the catalyst of high performance, and is obtained are 120-140 degrees C by the tenter extending method etc. Young's modulus is about [220-260kg //mm] two, degree of crystallinity is high (about 70%), and its stereoregularity is [this film] good (about 90%). Therefore, this polypropylene film stands high in rigidity, the melting point, heat-resistant deformans, a degree of hardness, creep resistance, chemical resistance, etc. as compared with the conventional polypropylene film.

[0004]

[Function] Young's modulus is large, the high rigidity polypropylene film concerning this invention has small **** elongation after fracture, its coefficient of sliding friction is small, and whenever [blocking] is large. Although these physical properties need to decrease remarkably the trouble at the time of rolling up of a vacuum evaporationo metalization film which manufactured this as a raw material and it is necessary to roll a film capacitor from the configuration and to change reinforcement, said high rigidity polypropylene film has high Young's modulus, and since coefficient of friction is small, it can set up the reinforcement of component rolling up comparatively easily. Furthermore, this quantity rigidity polypropylene film has high heat deflection temperature, and since heating contraction is small, it can improve the maximum service temperature of the film capacitor which will become from now on by 105 degrees C.

[0005]

[Example] Next, the example of this invention is explained with reference to an accompanying drawing. Drawing 2 puts a capacitor element 10 in the plastics case 3, the capacitor product 30 which was filled up with the epoxy resin 4 and completed is a sectional view a part, this example capacitor element 10 of drawing 1 is an exfoliation expansion **** perspective view a part, and they show [drawing 3 and drawing 4 are the graphical representations of the life test data of a capacitor, and] a temperature life property and an electrical-potential-difference life property, respectively. In addition, in the following examples, the "Chisso HCPP-film" (trade name: Chisso Corp. make) which is high rigidity polypropylene was used as a polypropylene film. 240kg (ASTM D 882) /of Young's modulus is [mm] 2, the property of this film has high degree of crystallinity, and the stereoregularity of the property is good, and it is excellent in rigidity, the melting point, heat-resistant deformans, a degree of hardness, creep resistance, and chemical resistance.

[0006] In drawing 1 , the 1st vacuum evaporationo metalization film 1 consists of evaporation-alloying vacuum evaporationo heavy edge parts (thick edge section) 15 of the security device which consists of a vacuum evaporationo aluminum thin line part (fuse section) which protruded on left-hand side from the vacuum evaporationo aluminum 13 of the shape of a strip of paper which left the margin 12 to the right end edge and was vapor-deposited by the front face of a high rigidity polypropylene film at it, and the vacuum evaporationo aluminum 13 of the shape of each strip of paper, and a left end edge.
[0007] Moreover, the 2nd vacuum evaporationo metalization film 2 leaves margin 12' to a left end edge on the front face of the polypropylene film 11 of high rigidity, has the compound vacuum evaporationo metal 23 with which the laminating of aluminum and the zinc was carried out by using aluminum as a lower layer and making zinc into the upper layer, and is what made heavy edge section 23', and is in a right end edge. In this compound vacuum evaporationo metal layer 23, the upper (vacuum evaporationo zinc layer) thickness was formed for the thickness of a lower layer (vacuum evaporationo aluminum layer) as 97% 3%. In addition, the polypropylene film with a thickness [of 6 micrometers] and a width of face of 50mm of high rigidity was used for the film which is the base of the 1st and 2nd vacuum evaporationo metalization film, and capacity was set to 20 micro F. And the polymerization of the high rigidity vacuum evaporationo metalization polypropylene film, the 1st vacuum evaporationo metalization film 1 and the 2nd vacuum evaporationo film 2, of two sheets was carried out, it was wound, it pulled out to the roll edge side, the zinc metallizing layers (Metallikon section) 16 and 26 were formed as an electrode, and lead wire 17 and 27 was attached further.
[0008] As the capacitor element 10 manufactured as mentioned above was shown in drawing 2 , it inserted in the plastics case and was filled up with the epoxy resin 4 in between [these]. And the top cover of the plastics case 3 was equipped with the external drawer terminals 5 and 6 of lead wire 17 and 27, and the completion of manufacture of the capacitor product 30 was carried out.
[0009] In drawing 1 , while the base of the polypropylene film of high rigidity is used for the 1st and 2nd vacuum evaporationo metalization polypropylene films, the thickness of the heavy edge section 15 of the 1st vacuum evaporationo metalization film 1 is formed thickly and membrane resistance sets 1.5-3ohms /to 2 cm, the thickness resistance of the strip-of-paper-like vacuum evaporationo metal of the remainder is made into 3 - 6 ohm/cm 2. Moreover, the compound vacuum evaporationo metal layer 23 of the aluminum of the 2nd metalization film 2 and zinc and 23' make a membrane resistance value 7 - 20 ohm/cm 2, they form thickly the thickness of the heavy edge section 15 and 15', and membrane resistance forms them in 1.5 - 6 ohm/cm 2 thickly.
[0010]
[Comparative Example(s)] The vacuum evaporationo metallized film capacitor by the conventional technique was manufactured for the comparison. The base of the usual polypropylene film is used for the 1st and 2nd vacuum evaporationo metalization polypropylene films, and it is with a security device as a vacuum-evaporationo metal of the 1st vacuum-evaporationo metal film. It is what formed with aluminum and formed vacuum evaporationo zinc (compound vacuum evaporationo metal) as a vacuum evaporationo metal of the 2nd vacuum evaporationo metalization film, and all the unexpected configurations that usually used the base manufactured the base of polypropylene as the same as that of said example.
[0011] The temperature-proof performance test of the capacitor product and the capacitor product of the above-mentioned example of a comparison which were offered according to the above-mentioned this invention example was performed. The result is shown in drawing 3 . In addition, test voltage of a test condition is 370VAC, and capacity reduction performed the criterion with the time amount which became 5% to initial value. In drawing 3 , the graph line of ** mark is the thing of the example of a comparison, and - mark is the thing of this invention example. Seen from this drawing, the thing of this invention example receives maintaining the electrostatic capacity within a 100-hour or more criterion also under the conditions which raised impression temperature to 125 degrees C, and, as for the object of each example of a comparison, it turns out under this impression temperature that reduction in electrostatic

capacity falls within [in several hours] in addition to a criterion. moreover, as for the thing of the example of a comparison, electrostatic capacity becomes the bottom of a condition the outside of a criterion altogether among about 100 hours, using impression temperature as 110 degrees C -- receiving -- the thing of this invention example -- 10000- reduction in electrostatic capacity maintains less than a criterion even for tens of thousands hours or more, and it can check that the temperature-proof nature of the product of this invention is very high.

[0012] Drawing 4 performed the withstand voltage performance test of the capacitor product and the capacitor product of the above-mentioned example of a comparison which were offered according to this invention example. The result is shown in drawing 4 . In addition, a test temperature is 100 degrees C and the test condition judged the criterion with the rate of change of the electrostatic capacity to initial value similarly to be the above. In drawing 4 , the graph of ** mark is the thing of the example of a comparison, and - mark is the thing of this invention example. It sees from this drawing and it turns out that the thing of the example of a comparison becomes except a criterion within several hours under this applied voltage to reduction in electrostatic capacity being less than a criterion to near 100 hour also under the conditions to which the thing of this invention example raised applied voltage to 500V. Moreover, to electrostatic capacity becoming the bottom of the condition which set applied voltage to 400V the outside of a criterion altogether in hundreds of hours, as for the thing of the example of a comparison, the product of this invention does not have reduction in electrostatic capacity, a criterion is suited altogether for at least 10000 hours or more, and it can check that the endurance of the product of this invention is very high.

[0013] Drawing 5 shows the comparison of an electrical property. The graph of ** is the thing of the example of a comparison, and - mark is the thing of this invention example. It sees from this drawing and the thing of this invention example is understood that a hot electrical property is good, a corona generated voltage is high and there is little variation.

[0014]

[Effect of the Invention] As above-mentioned, degree of crystallinity is high, the vacuum evaporationo metallized film capacitor of this invention which comes to have the high rigidity vacuum evaporationo metalization film which vapor-deposited the metal on the good high rigidity polypropylene film of stereoregularity is conventionally compared with elegance, and thermal resistance, endurance, and a withstand voltage property are very excellent. A vacuum evaporationo-under polymerization metalization film for two sheets of the 1st vacuum evaporationo metalization film and the 2nd vacuum evaporationo metalization film which used the polypropylene film base of high rigidity of this invention especially Winding, In the vacuum evaporationo metallized film capacitor which pulls out to the end face and comes to prepare an electrode metallizing layer the vacuum evaporationo metal film capacitor which comes to constitute the vacuum evaporationo metal layer (the 1st electrode) of the 1st vacuum evaporationo metalization film from a compound metal layer of lower layer zinc and the upper vacuum evaporationo aluminum -- thermal resistance, endurance, and a withstand voltage property -- excelling . Especially, as the base, using the polypropylene film of high rigidity, the compound vacuum evaporationo metalization film of zinc and aluminum is excellent in thermal resistance as compared with what used the conventional polypropylene film, and an electrical property and physicochemical stability are also excellent.

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any
damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] An example capacitor element is an exfoliation expansion **** perspective view a part.
[Drawing 2] The capacitor product which inserted the capacitor element in the plastics case, was filled up with the epoxy resin, and was completed is a sectional view a part.
[Drawing 3] The graphical representation of the life test data of this invention example capacitor and the example capacitor of a comparison
[Drawing 4] The graphical representation of the heat test-proof data of this invention example capacitor and the example capacitor of a comparison
[Drawing 5] The graphical representation of the characteristic test data of this invention example capacitor and the example capacitor of a comparison
[Description of Notations]
1: The 1st vacuum evaporationo metalization film
2: The 2nd vacuum evaporationo metalization film
3: Plastics case
4: Epoxy resin
5 6: External drawer terminal
10: Capacitor element
11 11: Polypropylene film
12 12': Margin
13: Strip-of-paper-like vacuum evaporationo aluminum
14: Vacuum evaporationo aluminum thin line section
15: Vacuum evaporationo aluminum heavy edge section (thick edge section)
16 26: Zinc metallizing layer (Metallikon section)
17 27: Lead wire
23: The compound vacuum evaporationo metal layer of aluminum and zinc
23': Heavy edge section
30: Capacitor product

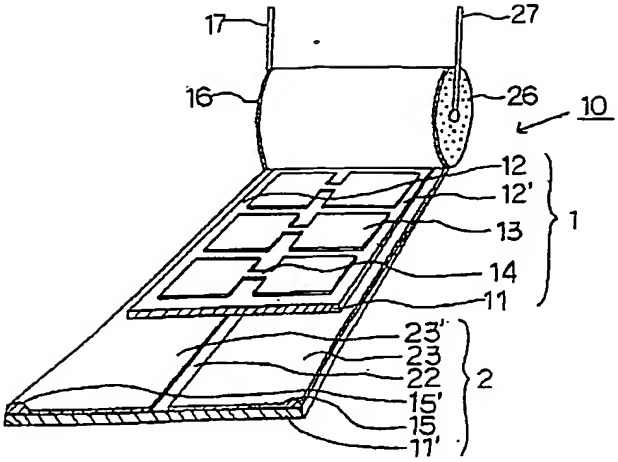
[Translation done.]

* NOTICES *

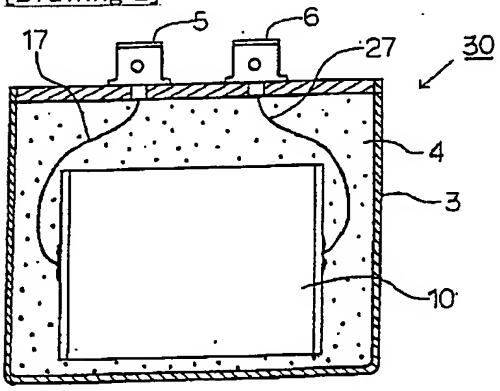
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]

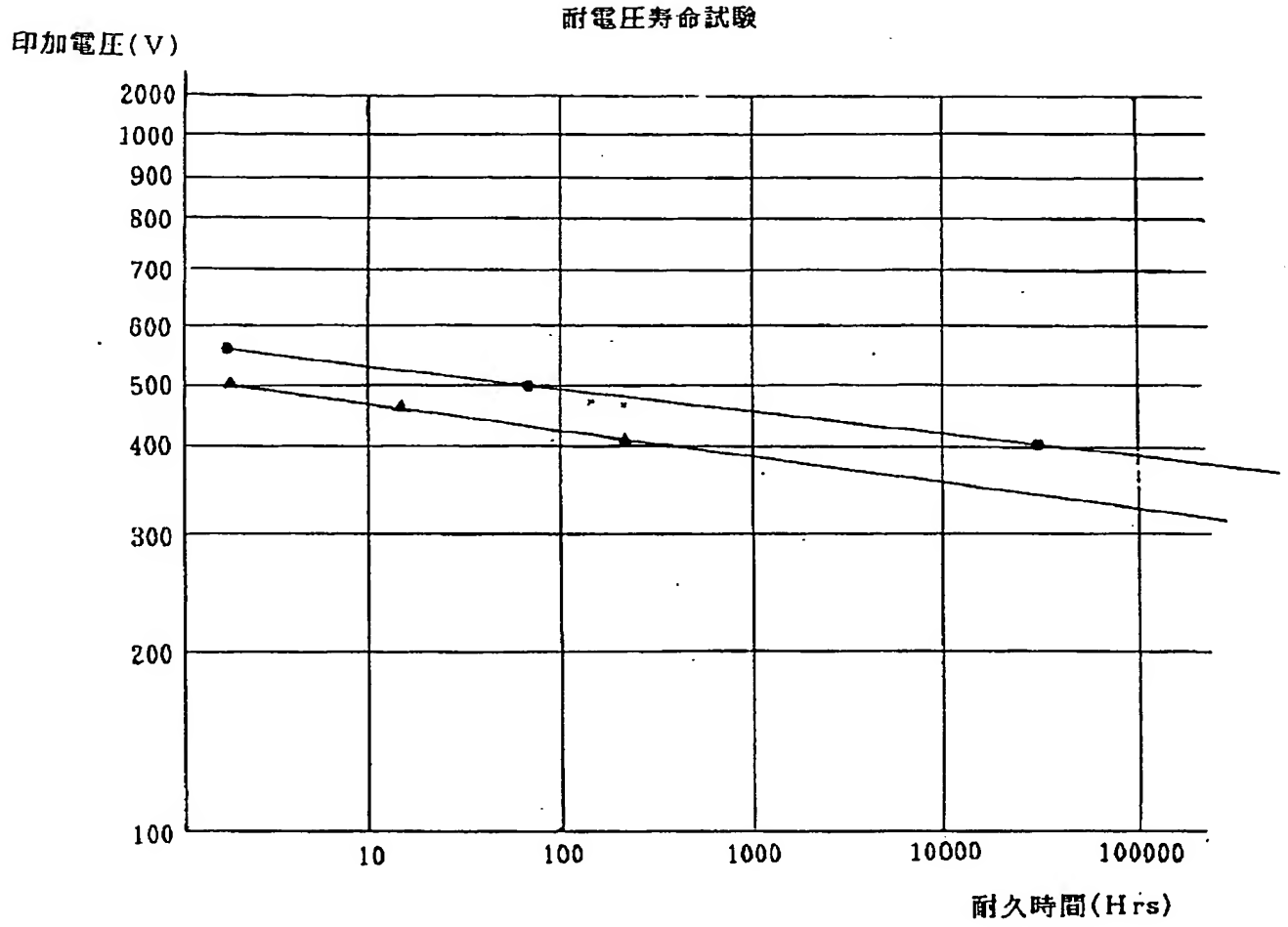


[Drawing 2]



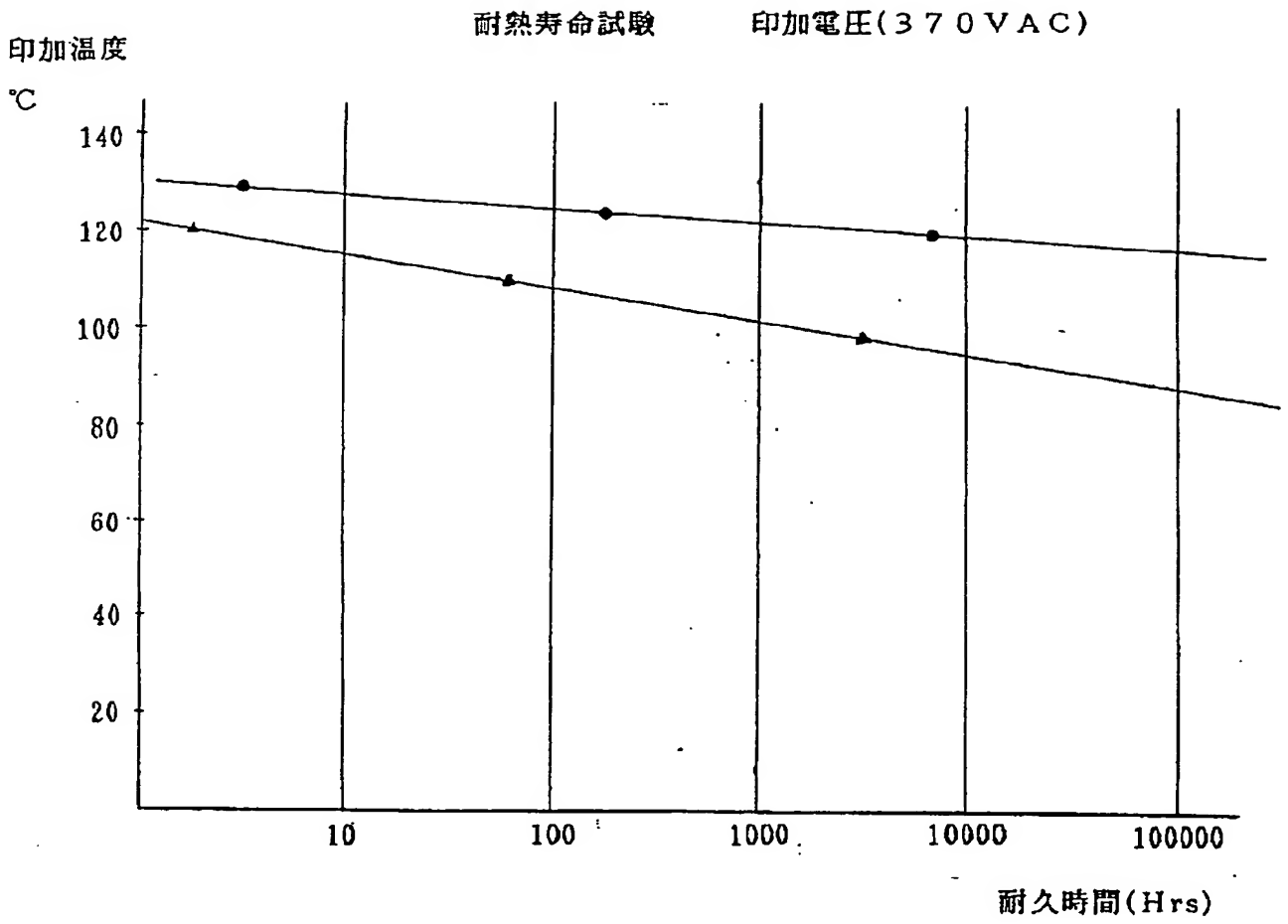
[Drawing 4]

【図4】


耐電圧寿命試験
印加電圧(V)
2000
1000
900
800
700
600
500
400
300
200
100
10
100
1000
10000
100000
耐久時間(Hrs)

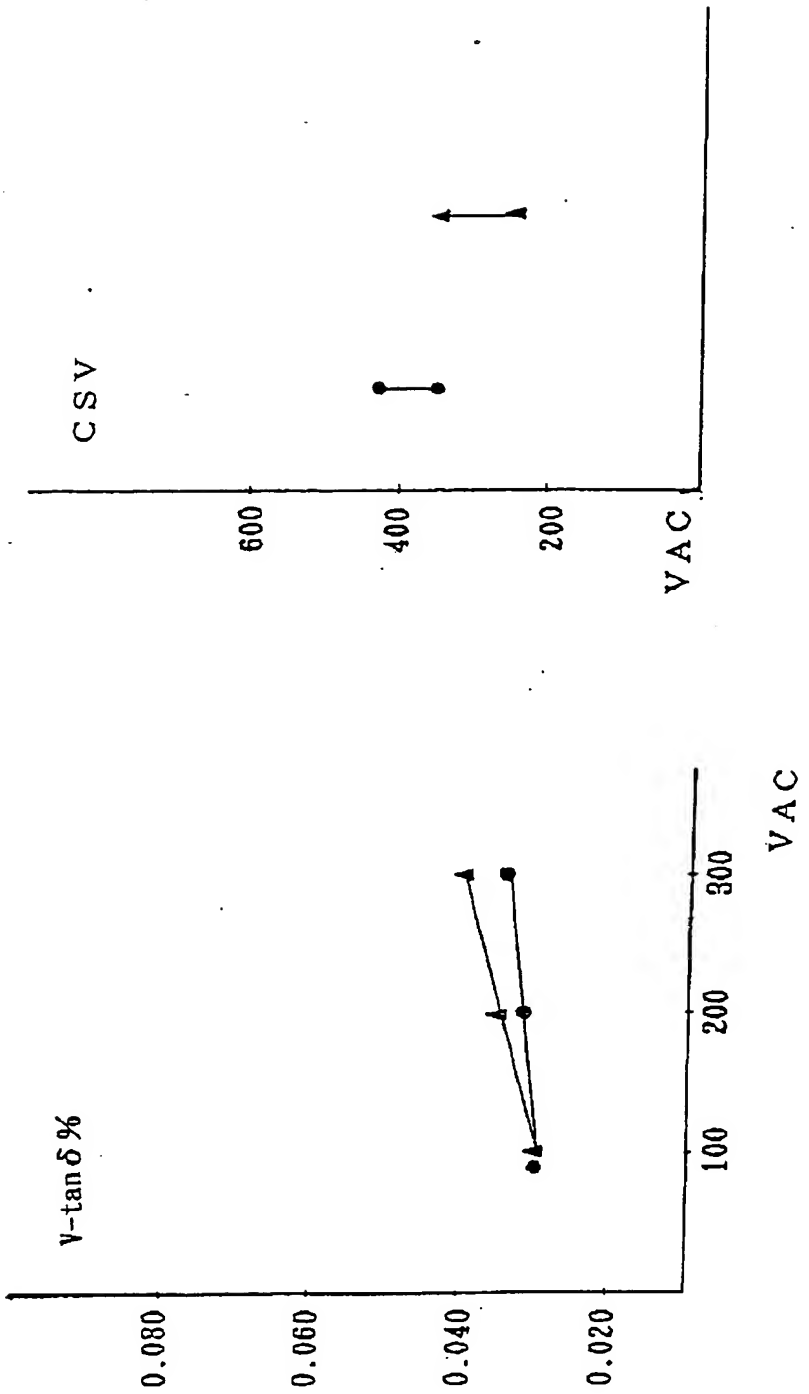
[Drawing 3]

【図３】


耐熱寿命試験　　印加電圧(３７０ＶＡＣ)
印加温度
℃
140
120
100
80
60
40
20
10
100
1000
10000
100000
耐久時間(Hrs)

[Drawing 5]

【図5】



[Translation done.]

(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号

特開平5－217799

(43)公開日　平成５年(1993)８月27日

(51)Int.Cl.[5]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｈ０１Ｇ　4/24	３２１　Ｃ	8019－5E		
	Ｂ	8019－5E		

審査請求　未請求　請求項の数10(全　7　頁)

(21)出願番号　特願平4－57609

(22)出願日　平成４年(1992)１月31日

(71)出願人　591174379
東洋コンデンサ株式会社
東京都大田区南馬込６－５－15

(72)発明者　前野　稔彦
東京都大田区南馬込６－５－15　東洋コンデンサ株式会社内

(72)発明者　鈴木　泰男
東京都大田区南馬込６－５－15　東洋コンデンサ株式会社内

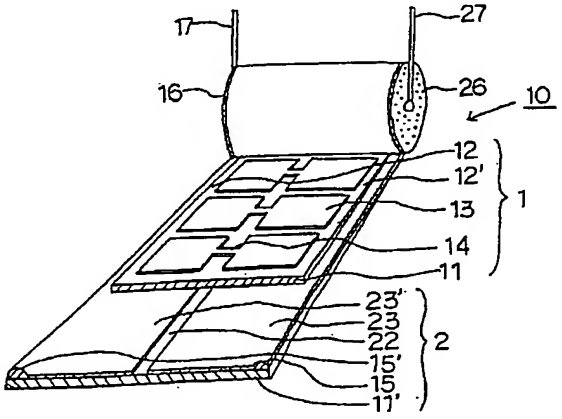
(74)代理人　弁理士　村田　幸雄

(54)【発明の名称】　蒸着金属化フィルムコンデンサ

(57)【要約】

【目的】　製造時における巻き取り加工特性が良好で、耐久性、耐熱性の優れた蒸着金属化フィルムコンデンサの提供。

【構成】　熱変形温度が１２０～１４０℃のポリプロピレン樹脂から成形され、ヤング率が２２０～２６０ｋｇ／ｍｍ² である、結晶化度が高く、立体規則性の良い高剛性ポリプロピレンフィルムに、金属を蒸着した高剛性蒸着金属化フィルムを備えてなることを特徴とする蒸着金属化フィルムコンデンサ。特に、第１の蒸着金属化フィルムと第２の蒸着金属化フィルムとの２枚を重合した蒸着金属化フィルムを巻回し、その巻回端面に引き出し電極金属溶射層を設けてなる蒸着金属化フィルムコンデンサにおいて、第１の蒸着金属化フィルムの蒸着金属層（第１電極）を蒸着アルミニウムで構成し、第２の蒸着金属化フィルムの蒸着金属層（第２電極）を亜鉛とアルミニウムとの複合蒸着金属層で構成し、かつ第１の蒸着金属化フィルムのフィルムと第２の蒸着金属化フィルムのフィルムを上記高剛性ポリプロピレンフィルムで構成したものも好ましい。



1

【特許請求の範囲】

【請求項１】　熱変形温度が１２０～１４０℃のポリプロピレン樹脂から成形され、ヤング率が２２０～２６０ｋｇ／ｍｍ² である、結晶化度が高く、立体規則性の良い高剛性ポリプロピレンフイルムに、金属を蒸着した高剛性蒸着金属化フイルムを備えてなることを特徴とする蒸着金属化フイルムコンデンサ。

【請求項２】　第１の蒸着金属化フイルムと第２の蒸着金属化フイルムとの２枚を重合した蒸着金属化フイルムを巻回し、その巻回端面に引き出し電極金属溶射層を設けてなる蒸着金属化フイルムコンデンサにおいて、第１の蒸着金属化フイルムの蒸着金属層（第１電極）を蒸着アルミニウムで構成し、第２の蒸着金属化フイルムの蒸着金属層（第２電極）を亜鉛とアルミニウムとの複合蒸着金属層で構成し、かつ第１の蒸着金属化フィルムのフィルムと第２の蒸着金属化フィルムのフィルムを請求項１記載の高剛性ポリプロピレンフィルムで構成してなることを特徴とする蒸着金属化フイルムコンデンサ。

【請求項３】　第１電極及び／又は第２電極の電極引き出し側端部を他の電極部分より厚く形成してなることを特徴とする請求項２記載の蒸着金属化フイルムコンデンサ。

【請求項４】　第１の蒸着金属化フイルム又は第２の蒸着金属化フイルムが、蒸着金属層を電極引き出し側端部及び該部に連結する細線部を残して、複数の短冊状に分割してなる保安機構を備えてなるものであることを特徴とする請求項２又は３記載の蒸着化金属フイルムコンデンサ。

【請求項５】　第１電極引き出し側端部の厚みが、抵抗値として１．５～３Ω／ｃｍ² であり、他の第１電極部分の厚みが、抵抗値として３～６Ω／ｃｍ² であることを特徴とする請求項３又は４記載の蒸着金属化フイルムコンデンサ。

【請求項６】　第２電極引き出し側端部の厚みが、抵抗値として１．５～６Ω／ｃｍ² であり、他の第２電極部分の厚みが、抵抗値として７～２０Ω／ｃｍ² であることを特徴とする請求項３ないし５のいずれかに記載の蒸着金属化フイルムコンデンサ。

【請求項７】　プラスチックフイルム上面の長手両端面に未蒸着部分を有し、かつ残部長手中央部分に蒸着金属層からなる共通電極部を有する共通電極金属蒸着化フイルムと、プラスチックフイルムの上面の長手中央部分に細帯状の未蒸着部を有し、かつ該細帯部を境界として形成された一方側の長手蒸着化金属層からなる第１電極と他方側の長手蒸着化金属層からなる第２電極とを有する第１、第２電極金属蒸着化フイルムとの２枚を重合して巻回し、その巻回第１、第２電極の端面に引き出し電極金属溶射層を設けてなる直列蒸着金属化フイルムコンデンサにおいて、共通電極部の蒸着金属層を蒸着アルミニウム、蒸着亜鉛又は亜鉛とアルミニウムなどの複合蒸着

2

金属で形成し、かつ共通電極部を蒸着金属層からなる細線部で連結された左右一対の短冊状蒸着金属層の多数個で構成した保安機構を備えてなるものとし、そしてかつプラスチックフィルムを請求項１記載の高剛性ポリプロピレンで構成したことを特徴とする直列蒸着金属化フイルムコンデンサ。

【請求項８】　請求項１ないし７のいずれかに記載の蒸着金属化フイルムコンデンサを、プラスチックケースに装入し、前記コンデンサ本体とケースの間にエポキシ樹脂等の合成樹脂を充填してなることを特徴とする蒸着金属化フイルムコンデンサ。

【請求項９】　請求項１ないし７のいずれかに記載の蒸着金属化フイルムコンデンサを、金属又はプラスチックのケースに装入し、上記コンデンサ本体とケースの間に含浸液として液状エポキシ樹脂を注入してなることを特徴とする蒸着金属化フィルムコンデンサ。

【請求項１０】　含浸液が、芳香族酸と高級アルコールのエステル類又はこれらと液状エポキシ樹脂との混合物よりなることを特徴とする請求項９記載の蒸着金属化フィルムコンデンサ。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は蒸着金属化フイルムコンデンサに関し、特に巻き取り加工特性が良好で、耐久性、耐熱性の優れた蒸着金属化フイルムコンデンサに関する。

【０００２】

【従来の技術及び発明が解決しようとする課題】一般的に蒸着金属化フィルムコンデンサは、第１の蒸着金属化フィルムと第２の蒸着金属化フィルムとの２枚を重合した蒸着金属化フィルムを巻回し、その巻回端面に引出し電極金属溶射層を設け、さらにこれをプラスチックケースに装入して構成されている。その蒸着金属化フイルムコンデンサの製造においては、巻き取り時に蒸着金属化フイルムにシワが生じたり異物が混入すること、またフイルムにキズがつくことなどの問題点がある。これらの問題点はいずれもコンデンサの品質を低下させるものであり、例えばフイルムにシワが入るとその部分に水分を含む空気が保持され、その部分の電気特性を劣化させ、局部的なコロナ放電の原因にもなる。このシワの原因として、巻き取り中の微妙な回転速度やテンションの変動、機械の振動などがあり、その対応策が求められている。また、ポリプロピレンフイルムは、コンデンサ用として優れた誘電特性を持ち、特に損失、温度特性に優れるが、欠点として耐熱性が低く最高使用温度が９０℃以下に制限されている。

【０００３】

【課題を解決するための手段及び作用】フィルムコンデンサの製造時における蒸着金属化フイルムの巻き取りを良好に達成する手段としては、装置面でもオートテンシ

ョン、ラインスピードなど、色々の工夫がなされているが、未だ完全なものではない。本発明者はこの点の解決するため、優れた電気特性を有し、巻き取り時の問題点をなくすフイルムとして、フイルムの表面硬度が高く、ヤング率が高く、伸びが少なく、またすべり易く、ブロッキング度の高いフイルムを使用することを検討し、各種プラスチックフイルムを検討した結果、結晶化度と立体規則性を著しく高めた高剛性ポリプロピレンフイルムがフイルムコンデンサ用に適していることを発見した。本発明者はさらに鋭意研究を進め、結晶化度が高く、立体規則性の良い高剛性ポリプロピレンフイルムに金属を蒸着して構成した蒸着金属化フイルムを使用することにより、シワやキズの極めて少ない蒸着金属化フイルムの巻き取り体を得ることに成功した。これはまた誘電率などコンデンサとして優れた特徴を有し、かつ耐熱温度が１００℃以上に耐えるコンデンサとなることを知見した。

【０００４】本発明は研究、知見の結果から達成されたものであり、すなわち、熱変形温度が１２０～１４０℃のポリプロピレン樹脂から成形され、ヤング率が２２０～２６０ｋｇ／ｍｍ² である、結晶化度が高く、立体規則性の良い高剛性ポリプロピレンフイルムに、金属を蒸着した高剛性蒸着金属化フイルムを備えてなることを特徴とする蒸着金属化フイルムコンデンサである。上記の結晶化度と立体規則性の極めて高い高剛性ポリプロピレンフィルムは、公知（例えば、特開昭５８－１０４９０７号公報、特開平２－２０６６０５号公報参照）のものであり、例えば三塩化チタンと有機アルミニウム化合物を芳香族カルボン酸エステルなどの電子供与体で前処理した、高活性、高性能の触媒を使用してプロピレンを重合させて得られる熱変形温度が１２０～１４０℃のポリプロピレン樹脂を、テンター延伸法等によりフィルム化することによって製造されるものである。このフィルムは、ヤング率が２２０～２６０ｋｇ／ｍｍ² 程度であり、結晶化度が高く（７０%程度）、立体規則性の良い（９０%程度）ものである。したがって、このポリプロピレンフィルムは、従来のポリプロピレンフィルムに比して、剛性、融点、耐熱変形性、硬度、耐クリープ性、耐薬品性等において、卓越したものである。

【０００４】

【作用】本発明に係る高剛性ポリプロピレンフィルムは、ヤング率が大きく引張破断伸びが小さく、滑り摩擦係数が小さく、ブロッキング度が大きい。これらの物性は、これを原料として製造した蒸着金属化フイルムの巻き取り時の問題点を著しく減少させることができ、またフイルムコンデンサはその形状から巻き強度を変える必要があるが、前記高剛性ポリプロピレンフイルムは、ヤング率が高く、摩擦係数が小さいため、素子巻き取りの強度を比較的容易に設定することができる。さらに、本高剛性ポリプロピレンフイルムは、熱変形温度が高く、

加熱収縮率が小さいため、これからなるフイルムコンデンサの最高使用温度を１０５℃までに向上することができる。

【０００５】

【実施例】次に、本発明の実施例について添付図面を参照して説明する。図１は本実施例コンデンサ素子１０の一部剥脱展開略説斜視図であり、図２はコンデンサ素子１０をプラスチックケース３に挿し、エポキシ樹脂４を充填して完成したコンデンサ製品３０の一部断面図であり、図３、図４はコンデンサの寿命試験データのグラフ図であり、それぞれ温度寿命特性、電圧寿命特性を示す。なお、以下の実施例においては、ポリプロピレンフィルムとして、高剛性ポリプロピレンである「チッソＨＣＰＰ－フィルム」（商品名：チッソ株式会社製）を使用した。該フィルムの特性は、ヤング率（ＡＳＴＭ　Ｄ８８２）が２４０ｋｇ／ｍｍ² で、結晶化度が高く、立体規則性の良く、剛性、融点、耐熱変形性、硬度、耐クリープ性、耐薬品性に優れたものである。

【０００６】図１において、第１の蒸着金属化フイルム１は高剛性ポリプロピレンフイルムの表面に、右端縁部にマージン１２を残して蒸着された短冊状の蒸着アルミニウム１３と各短冊状の蒸着アルミニウム１３から左側に突設された蒸着アルミニウム細線部分（ヒューズ部）とからなる保安機構及び左端縁部の蒸着アロイ蒸着ヘビーエッジ部分（肉厚端縁部）１５とから構成される。

【０００７】また、第２の蒸着金属化フイルム２は、高剛性のポリプロピレンフイルム１１の表面に、左端縁部にマージン１２′を残してアルミニウムと亜鉛とがアルミニウムを下層とし亜鉛を上層として積層された複合蒸着金属２３を有し、且つ右端縁部にヘビーエッジ部２３′を形設したもので有る。該複合蒸着金属層２３においては、下層（蒸着アルミニウム層）の厚さを３%、上層（蒸着亜鉛層）の厚さを９７%として形成した。なお、第１及び第２蒸着金属化フイルムのベースであるフイルムには、厚み６μｍ、幅５０ｍｍの高剛性のポリプロピレンフイルムを使用し、容量は２０μＦとした。そして、第１の蒸着金属化フイルム１と第２の蒸着フイルム２の２枚の高剛性蒸着金属化ポリプロピレンフイルムは重合して巻回され、その巻端面に引き出し電極として亜鉛金属溶射層（メタリコン部）１６、２６が設けられ、さらにリード線１７、２７が取り付けられた。

【０００８】以上のようにして製作されたコンデンサ素子１０を図２に示すごとく、プラスチックケースに挿入し、それら間にエポキシ樹脂４を充填した。そして、プラスチックケース３の上蓋にリード線１７、２７の外部引き出し端子５、６を装着してコンデンサ製品３０を製作完了した。

【０００９】図１において、第１及び第２の蒸着金属化ポリプロピレンフイルムには高剛性のポリプロピレンフイルムのベースを使用し、第１の蒸着金属化フイルム１

のヘビーエッジ部１５の膜厚を厚く形成し、膜抵抗が１．５～３Ω／ｃｍ² とする一方、残部の短冊状蒸着金属の膜厚抵抗値を３～６Ω／ｃｍ² とする。又、第２の金属化フイルム２のアルミニウムと亜鉛の複合蒸着金属層２３、２３′は膜抵抗値を７～２０Ω／ｃｍ² としヘビーエッジ部１５、１５′の膜厚を厚く形成し、膜抵抗が１．５～６Ω／ｃｍ² に厚く形成する。

【００１０】

【比較例】比較のため従来技術による蒸着金属化フイルムコンデンサを製作した。第１及び第２の蒸着金属化ポリプロピレンフイルムには通常のポリプロピレンフイルムのベースを使用し、第１の蒸着金属フイルムの蒸着金属として、保安機構付き　付きアルミニウムを形成し、第２の蒸着金属化フイルムの蒸着金属として蒸着亜鉛（複合蒸着金属）を形成したもので、ポリプロピレンのベースを通常ベースを使用した意外の構成は全て前記実施例と同一として製作した。

【００１１】上記本発明実施例により提供されたコンデンサ製品と上記比較例のコンデンサ製品との耐温度性能テストを行った。その結果を図３に示す。なお、テスト条件は、試験電圧が３７０ＶＡＣであり、判定基準は、初期値に対して容量減少が５％になった時間をもって行った。図３において、▲印のグラフ線は比較例のものであり、●印は本発明実施例のものである。同図からみて、本発明実施例のものは印加温度を１２５℃に高めた条件下でも１００時間以上判定基準以内の静電容量を維持するに対して、各比較例の物は同印加温度下では数時間以内で静電容量の減少が判定基準以外に低下してしまうことが解る。また、印加温度を１１０℃として条件下においては、比較例のものは１００時間程度の間で全て静電容量が判定基準外となってしまうのに対して、本発明実施例のものは１００００～数万時間以上でも静電容量の減少が判定基準以内を保ち、本発明の製品は非常に耐温度性の高いものであることが確認できる。

【００１２】図４は本発明実施例により提供されたコンデンサ製品と上記比較例のコンデンサ製品との耐電圧性能テストを行った。その結果を図４に示す。なお、テスト条件は、試験温度が１００℃であり、判定基準は、前記と同様に初期値に対する静電容量の変化率により判定した。図４において、▲印のグラフは比較例のものであり、●印は本発明実施例のものである。同図から見て、本発明実施例のものは印加電圧を５００Ｖに高めた条件下でも１００時間付近まで静電容量の減少が判定基準以内であるのに対して、比較例のものは同印加電圧下では数時間以内に判定基準以外となってしまうことが解る。また、印加電圧を４００Ｖとした条件下においては、比較例のものは数百時間で全て静電容量が判定基準外となってしまうのに対して、本発明の製品は１００００時間以上でも静電容量の減少がなく全て判定基準に適合し、本発明の製品は非常に耐久性の高いものであることが確認できる。

【００１３】図５は電気特性の比較を示す。▲のグラフは比較例のものであり、●印は本発明実施例のものである。同図より見て、本発明実施例のものは高温に於ける電気特性が良好で、コロナ発生電圧が高くバラツキが少ないことがわかる。

【００１４】

【発明の効果】上記のとおり、結晶化度が高く、立体規則性の良い高剛性ポリプロピレンフイルムに、金属を蒸着した高剛性蒸着金属化フイルムを備えてなる本発明の蒸着金属化フイルムコンデンサは、従来品に比し耐熱性、耐久性及び耐電圧特性が非常に優れたものである。特に、本発明の高剛性のポリプロピレンフイルムベースを使用した第１の蒸着金属化フイルムと第２の蒸着金属化フイルムとの２枚を重合下蒸着金属化フイルムを巻回し、その端面に引き出し電極金属溶射層を設けてなる蒸着金属化フイルムコンデンサにおいて、第１の蒸着金属化フイルムの蒸着金属層（第１電極）を下層の亜鉛と上層の蒸着アルミニウムとの複合金属層で構成してなる蒸着金属フイルムコンデンサは耐熱性、耐久性及び耐電圧特性の優れたものである。特に、高剛性のポリプロピレンフイルムをベースとして使用し亜鉛とアルミニウムとの複合蒸着金属化フイルムは、従来のポリプロピレンフイルムを使用したものと比較して耐熱性が優れ、電気特性、物理化学的安定性も優れている。

【図面の簡単な説明】

【図１】実施例コンデンサ素子の一部剥脱展開略説斜視図。

【図２】コンデンサ素子をプラスチックケースに装入し、エポキシ樹脂を充填して完成したコンデンサ製品の一部断面図。

【図３】本発明実施例コンデンサ及び比較例コンデンサの寿命試験データのグラフ図

【図４】本発明実施例コンデンサ及び比較例コンデンサの耐温度試験データのグラフ図

【図５】本発明実施例コンデンサ及び比較例コンデンサの特性試験データのグラフ図

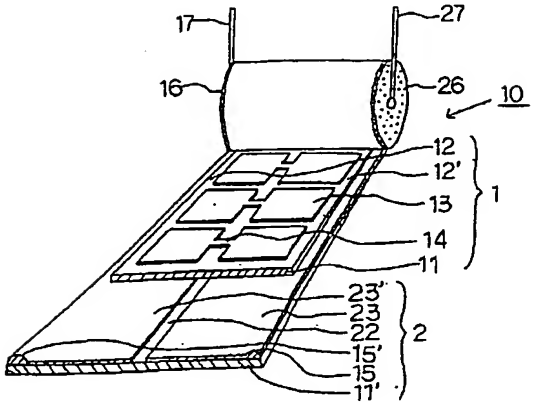
【符号の説明】

１：第１の蒸着金属化フイルム
２：第２の蒸着金属化フイルム
３：プラスチックケース
４：エポキシ樹脂
５、６：外部引き出し端子
１０：コンデンサ素子
１１、１１：ポリプロピレンフイルム
１２、１２′：マージン
１３：短冊状の蒸着アルミニウム
１４：蒸着アルミニウム細線部
１５：蒸着アルミニウムヘビーエッジ部（肉厚端縁部）
１６、２６：亜鉛金属溶射層（メタリコン部）

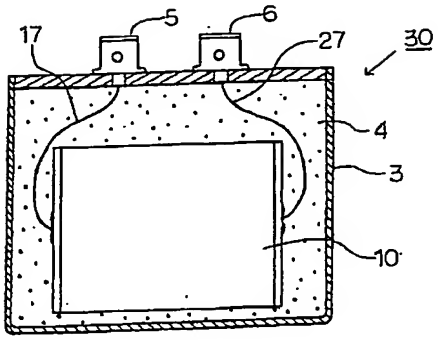
7　　8

１７、２７：リード線
２３：アルミニウムと亜鉛との複合蒸着金属層
＊２３′：ヘビーエッジ部
＊　３０：コンデンサ製品

【図１】

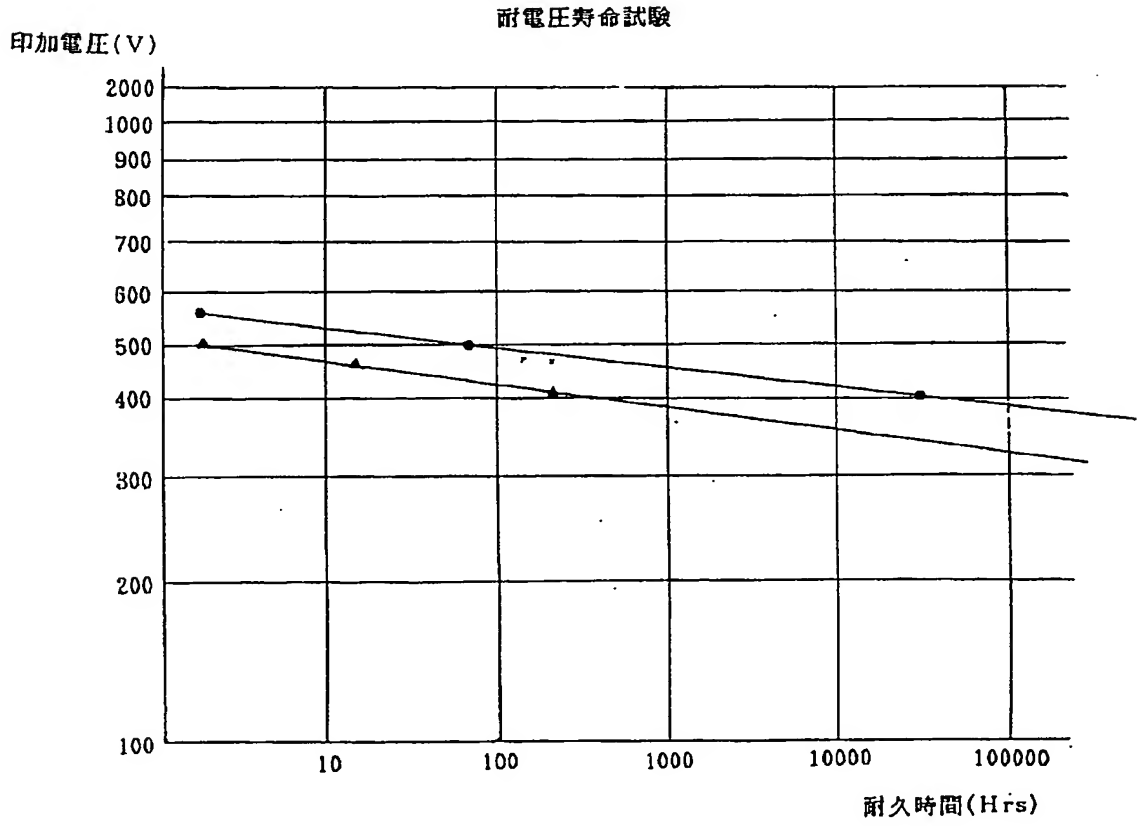


【図２】



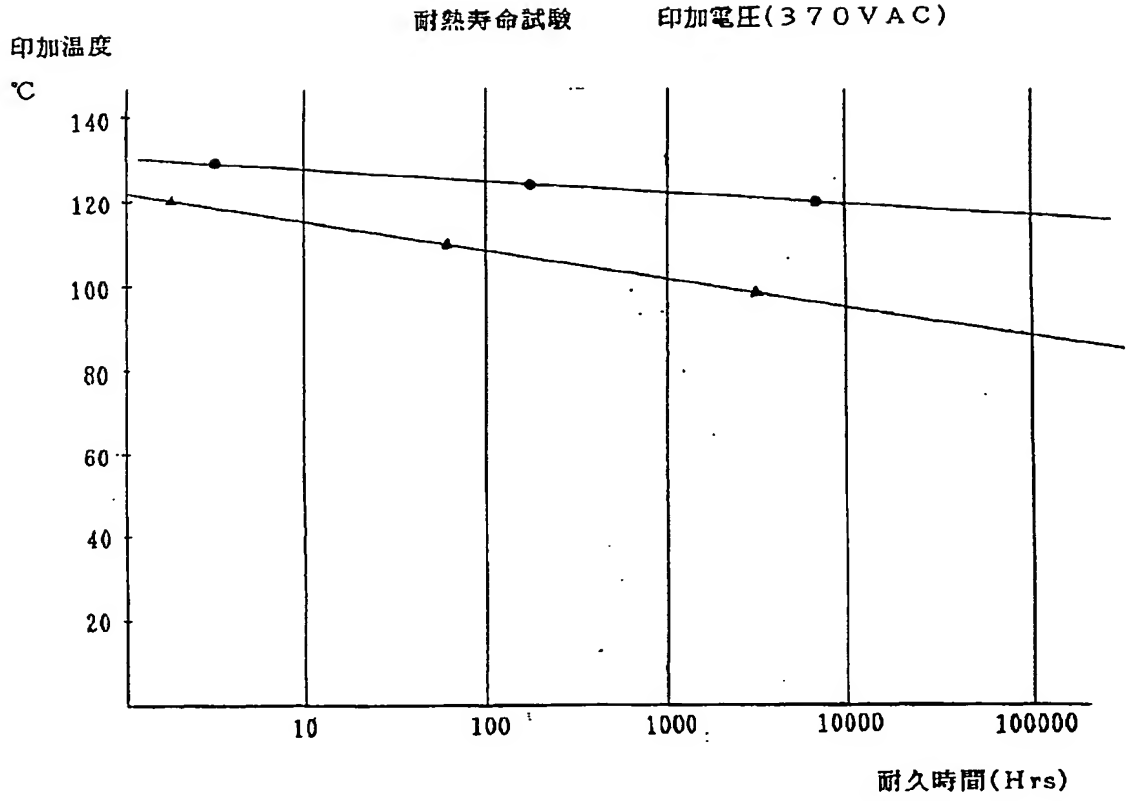
【図４】

【図４】

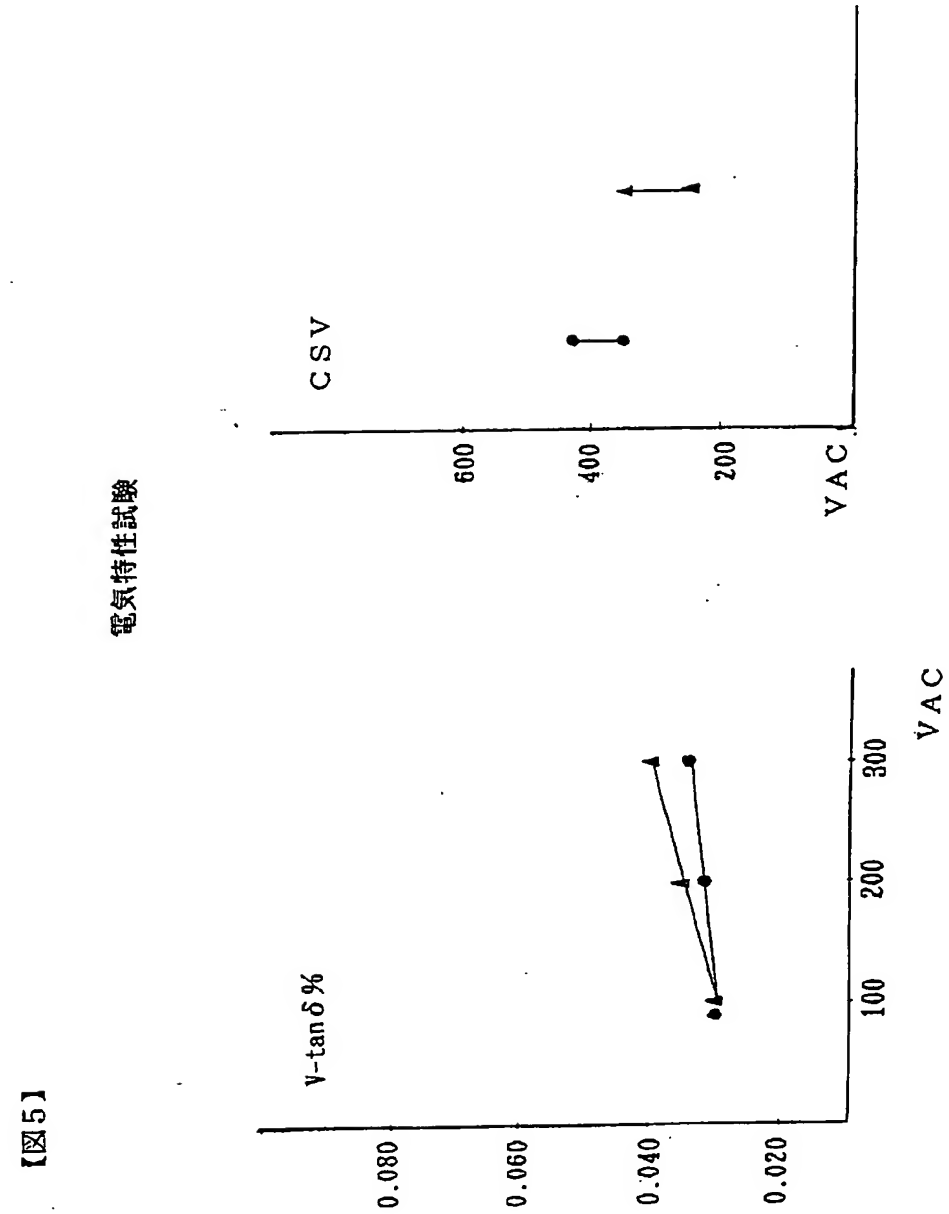


【図３】

【図３】


耐熱寿命試験　　印加電圧(３７０ＶＡＣ)
印加温度
℃
140
120
100
80
60
40
20
10
100
1000
10000
100000
耐久時間(Hrs)

〔図5〕


【図5】
電気特性試験
CSV
600
400
200
VAC
V-tanδ%
0.080
0.060
0.040
0.020
100
200
300
VAC

This Page is Inserted by IFW Indexing and Scanning Operations and is not part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☑ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☑ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☑ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.
As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.